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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF ENTOMOLOGY.

NEWS-LETTER

OF

THE

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I N V E S T I G A T I O N S.

Volume I,

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Recently, while attending the 50th anniversary meeting of the Entomological Society of Ontario at Guelph, Canada, Dr. C. Gordon Hewitt, Entomologist for the Dominion of Canada, handed us these notes on the Criddle mixture, by the originator, Mr. Norman Criddle, Treesbank, Manitoba, and they are being used here with the consent of Mr. Criddle. The notes will have a double value, in that they not only show the work of a careful observer but also the much to be desired qualifications in a field entomologist, namely, the ability to utilize the results of careful observation.

#### SOME NOTES ON THE "CRIDDLE MIXTURE."

The origin of the grasshopper bait, christened by the late Doctor Fletcher, Criddle Mixture," was due to an observation that grasshoppers were in the habit of abandoning all vegetation in favor of freshly-dropped horse dung, this preference being so marked as to leave no doubt in the minds of even the most casual observers. Dropings left several hundred feet in the midst of growing grain at once attracted grasshoppers from the edges of fields so that they might be seen marching steadily towards the direction from which the odor came, and then, having speedily devoured the droppings, they attacked the surrounding crop with the result that a large bare patch would be made in the midst of it. A few examples such as this seem in themselves sufficient evidence of the substances attractiveness, but if more were needed the roads and manure piles amply verified what had been observed before.

The second ingredient, salt, was also added through observation. It is well known that clothing and the handles of any farm implement will attract grasshoppers on account of the salty taste, caused through contact with the human skin, while experiments supplementary to this observation showed that they readily ate any article steeped in salt water. For this reason salt was added and proved particularly valuable after the droppings became dry.

The third ingredient was largely a matter of cost and convenience. Paris green, arsenic, or arsenite of soda would doubtless prove equally successful as a killing agent, and Paris green was selected on account of its availability in sufficient quantity. After numerous experiments the following formula was adapted as most suitable:

Horse droppings, preferably fresh, by measure-----	100 parts
Salt-----	1 pound or part
Paris green-----	1 pound or part

This approximates 15 gallons by measure of horse manure to 1 pound of Paris green and salt. It may be mixed in two ways, namely, dry with sufficient water added to make a thoroughly moist, but not sloppy, mash; or by placing the Paris green and salt in water first



and pouring this over the droppings. Before application it is necessary to pay some attention to weather conditions. Cloudy days, or those in which the temperature is below 60° F., should be avoided and preference given to those in which sunshine and heat predominate. In applying it the best method seems to be to scatter it thinly among the grasshoppers every few days. It can, however be put out in small heaps, in which condition its attractiveness lasts longer but it is more dangerous to stock.

There is no doubt whatever as to the remarkable attractiveness of this mixture at all periods, from the time of the locust's appearance in May until they die in September, or of its superiority over any other form of extermination yet tried in these parts. The evidence of farmers is almost unanimous on this point, and all the best type speak with enthusiasm of its value, the few exceptions being due to faulty methods in its application and mixture. My brothers and I have also used it continuously for the last ten years with perfect success and at very small cost, the last occasion being this season when we undoubtedly saved many acres of crop, while on more than one occasion its use undoubtedly saved the whole crop, as was shown by the destruction of those not treated.

This, however, refers only to Manitoba, as my experiences have been but casual outside, but I am of opinion that climatic conditions, particularly humidity, play an important part in the success or failure of this mixture. From a few observations made in Quebec some years ago I found horse dung far less attractive there, and the roadways, which in Manitoba would be swarming with locusts, were comparatively free. Judging from this, I would expect to find it valueless in the moister parts of Canada and the U. S., and most useful in the dryer Northern States, particularly the Dakotas, Minnesota, and Montana, as well as Alberta, Saskatchewan, and Manitoba.

Why a mixture so attractive in Manitoba should prove useless in Quebec in a time of drought, with the same species of grasshopper involved, is difficult to answer. That it is so there seems no doubt, and the problem is therefore to ascertain, with accuracy, what the conditions are and where the conditions are favorable or otherwise. I should consider that a trustworthy indication would be to watch the freshly-dropped dung and roadway. When the dung is eaten freely, the mixture should prove a success; when grasshoppers are not so attracted it will prove a failure.

It may not be out of place to remark in conclusion that stable water from behind the stalls is even more attractive than dung and has proved a remarkable attractant when mixed with other material such as bran or sawdust, while grasshoppers have been observed to actually devour the earth in places where it has been left. Dry cow dung is also readily devoured.

Norman Criddle,

August 22, 1913.



Messrs. Guy E. Pitts, of the range caterpillar investigation force, and Henry R. Jennings, of the alfalfa weevil investigation force, have both resigned.

Mr. L. J. Bower, a graduate in Entomology at the Texas Agricultural College, has been appointed to this Section and attached to the Wellington, Kans., station.

The terrible drought in Kansas is very seriously interfering with the work of Mr. Kelly and the rest of the laboratory force at Wellington, even if it does not make a temporary removal to some other point necessary.

Mr. Geo. I. Reeves spent some time during September in Oregon and Washington looking up a number of matters, among them what appears to be an outbreak of the clover flower midge in the Willamette Valley.

A rather serious outbreak of the chinch bug occurred during early September in pastures on the demonstration farm of the Bureau of Animal Industry at Denison, Tex., and was investigated from our Wellington, Kans., station.

Messrs. John R. Sandige, Irving R. Crawford, F. H. Gates, E. J. Bashe, Olin Hukill, J. H. Newton, and Arthur Matthiesen, short term men, have all returned to their college and university work. Mr. C. W. Rosewall goes to take up his work as instructor in entomology in the Louisiana State University, Baton Rouge, La.

Mr. C. N. Ainslie has recently found that larvae of *Diabrotica longicornis* have done a great deal of damage to growing corn in South Dakota and eastern Nebraska, and has found adults scattered over southern Minnesota. Mr. George G. Ainslie is finding the same insect infesting corn on bottom lands in Tennessee, while he finds that the beetles are common in similar localities in Kentucky.

It will be a matter of interest to all to know that Dr. Hewitt, Entomologist of the Dominion of Canada, is organizing a series of field laboratories and stations patterned after those in the United States. Dr. Hewitt is to be congratulated on securing such a promising lot of young fellows as he now has working under him and laying the foundation for future work, which surely will make its influence felt in Canadian husbandry. Doctor and Mrs. Hewitt expect to visit some of our field stations, notably at Salt Lake, during the current month.

Mr. Hyslop made a trip to Bridgeport, N. Y., to continue observations on white grubs.

The rearing of an egg parasite of the chinch bug, in Kansas, by Mr. Jas. W. McColloch, of the Kansas Agricultural College, described by Mr. A. B. Gahan of this section as Eumicrosoma benifica, new genus and species, is an interesting find and serves to show that there is still opportunity for profitable studies among even our oldest and supposedly best known insects.



The following gentlemen comprise the House Committee on Agriculture of the next Congress:

Asbury F. Lever, Chairman, South Carolina; Gordon Lee, Georgia; Ezekiel S. Candler, jr., Mississippi; J. Thomas Heflin, Alabama; James T. McDermott, Illinois; John A. Maguire, Nebraska; Thomas L. Rubey, Missouri; James Young, Texas; H. M. Jacoway, Arkansas; Ralph W. Moss, Indiana; John V. Lesher, Pennsylvania; Michael K. Reilly, Wisconsin; Benjamin I. Taylor, New York; Dudley Doolittle, Kansas.

The Eastman Kodak Co. list a "Crown Tilting Tripod Top" at \$3. Quoting from the catalogue: "By the aid of this attachment the camera may be tilted at any angle upward or downward, and also reversed for verticle pictures without changing the back or removing it from the tripod." In entomological work it will be a very useful apparatus, especially in field work, in photographing insects and their injuries directly from above and for photographing at at angles impossible to obtain by the use of the tripod alone. For an illustration of the apparatus see page 89 of "Eastman Professional Photographic Apparatus and Material," a catalogue issued by the Eastman Kodak Co. (J. J. D.)

A convenient container for slide boxes will be made to order by a La Fayette, Ind. firm according to the following specifications, at 50 cents each or \$5 per dozen. The outside measurements of the box, which will be made of linden, are 4-3/4 by 10-3/4 inches and 7-1/2 inches high. Its construction is similar to that of a card index box, having a hinged top with a hook lock on the front, and it will hold seven wooden slide boxes of 25-slide capacity. Such a box will be useful in sending large slide collections from station to station; permit a satisfactory and uniform arrangement of the material; in systematic collections will permit rearrangement, additions, etc., to be made without necessitating a complete rearrangement of slides; will keep the boxes from dust; and as the lids of the individual boxes are never very secure and are easily overturned, the container will greatly reduce chances of "pieing" the slides. (J. J. D.)

The first number of the Journal of Agricultural Research, a new publication of the Department of Agriculture, will appear October 10. It contains a contribution from the section of Cereal and Forage Insect Investigations entitled, "The Serpentine Leaf Miner," (Agromyza pusilla Meig.)

